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Date: September 14, 2004
Re: ESSAAC Meeting Report
To: Al Diaz
Ghassem Asrar
Cc: Charles Kennel, Chair, NAC
From: Larry Smarr, Chair and the members of ESSAAC

The Earth System Science and Applications Advisory Committee held its 18th meeting on September 8-10. ESSAAC heard several presentations relating to NASA's plans for reorganization/transformation and paid particular attention to the implications for Earth sciences. The Committee was impressed by the obvious care and thoughtful analysis that NASA has invested in the efforts to fulfill the President's Vision for Space Exploration for the Agency, to simplify and clarify the headquarters organizational structure, and to preserve the highly successful and visible science programs of the agency.

The Committee was pleased to hear of NASA's continuing commitment to science and to a process for soliciting community advice relating to Earth science objectives and plans. ESSAAC believes that the approach to "evolve" a new advisory committee structure from the existing one is wise and achievable. In this model, Earth sciences and its community will continue to be represented by prominent Earth scientists on a merged "Science Directorate Advisory Committee," supplemented by a dedicated Earth sciences subcommittee that includes solar physics and the Sun-Earth connection. We look forward to stimulating interactions with our space science colleagues in the combined AC.

ESSAAC believes that the upcoming NRC "decadal survey" for the Earth sciences will provide important guidance to NASA and recommends that NASA continue to review how the new roadmapping exercises can be visibly grounded in past community reports and connected intimately to the new NRC study. Continued use of the NRC to provide strategic guidance to NASA's Earth science's programs will ensure that key strategic objectives drive the future program and that, as Al Diaz pointed out, the science community feels "ownership" for the evolving program.

As NASA reorganizes to align with the latest Presidential directive, the committee observes that NASA has a critical role in implementing *three* major Presidential directives or initiatives:

- Climate Change Research Initiative;
- U.S. Integrated Earth Observation System; and
- Vision for Space Exploration.

NASA's Earth science programs are *essential* to the success of the first two, and will surely prove to be so to the third. NASA's contributions to the Earth sciences are unique, numerous, and critically important to future efforts to protect life and property, facilitate responsible environmental stewardship, and understand and predict the dynamic earth system.

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In this period of transformation and reprioritization, it is imperative that NASA sustain a robust, leading edge Earth science program that enables success in all three of these defining Presidential directives. In the view of ESSAAC, it is critically important to continue to advocate for the Earth sciences "in its own right", as well as in the context of the Agency's new exploration mission with its "Moon-Mars" emphasis.

However, we are concerned that exciting new Earth Science opportunities may not receive the recognition and priority they deserve in the ongoing budget re-allocation process to address the third Presidential directive. We are also concerned that the necessary reorganization is leading to changes in priorities that may undermine our ability to address *all three* of the above Presidential directives. If so, this will significantly impact research as well as our partnerships with other national and international agencies (e.g., our discussions in this meeting on geodynamics, weather programs, IGEOS, IPY).

Although we found very useful the briefings on the high-level view of the NASA Transformation, ESSAAC would request that at our next meeting SMD move from describing the changes in the administrative structure to a more in-depth discussion of Earth Science opportunities and limitations. We and the earth sciences community need a better understanding of:

- Details of the reorganized SMD units
- Budgets, budget projections, and budget setting processes
- How these impact mission objectives, research strategies, the opportunities for new missions, funding for programs that support innovation and research

In addition to these important organizational and budgetary issues, the committee thinks it is appropriate to review the earth system science research portfolio enabled by this reorganization. Specifically, we would request briefings on:

- The timeline through 2020 for earth observing platforms and instruments;
- Plans to develop the scientific exploitation of the new information infrastructure and modeling approaches that NASA is putting in place, in particular through the Columbia Project;
- Progress toward an integrated Sun-Earth System Research Plan

The committee hopes that a number of these topics can be addressed at the November meeting.

In addition to these high level recommendations, the committee also examined in more detail a number of programmatic elements to which we turn now.

Project Columbia. The Committee compliments NASA on its aggressive, visionary implementation of Project Columbia as a high performance distributed system, using National Lambda Rail to link to advanced remote user visualization and analysis facilities. The committee looks forward to reviewing NASA's plans to:

- sustain continual improvement of a balanced program over the decades-long period of the Exploration Vision
- rapidly assimilate the full suite of NASA observations into coupled Earth system models
- Integrate new science into the whole Earth system modeling suite using the Earth System Modeling Framework (ESMF) software engineering environment to facilitate model development and software reuse.

Given this unexpected step function in underlying infrastructure to support both data analysis and integration with modeling programs, it is appropriate to reevaluate the expected *two-decade* time line for achieving the whole Earth system model suite.

EOSDIS. We were excited to hear about the progress on moving toward a Web/Grid services software architecture as a preliminary step toward a next generation national Earth science data system. The Committee was encouraged to hear the results of the EOSDIS customer satisfaction survey and congratulates the team responsible for this thorough work. The committee recommends that NASA continue to assess the service quality aspects of this important data distribution program and incorporate quantitative metrics in future updates. ESSAAC would also like to see metrics developed that assess how well EOSDIS supports data assimilative work involving large-scope coupled models. The stage is now set for ESSAAC to hear about the next generation of observing satellites that will provide the new observations to drive these models.

Technology Subcommittee. While ESSAAC understands the reasoning behind creating three subcommittees for Earth/Sun, solar System, and Universe, we also believe there may be some crosscutting topics such as Technology in which it would be advisable to coordinate development among all three science thrust areas. From the ESSAAC organizational perspective, this would entail either merging the former Technology Subcommittee with its Space counterpart or creating a new Technology advisory subcommittee with sub-teams in each of the three science areas.

Geodynamics Program. The transfer of NASA's geodynamics activities to the Solar System Directorate, as part of the NASA transformation, is a highly visible and intriguing move. This will likely raise numerous questions from the community at large, concerning the ongoing integrity of the transformed geodynamics program, which remains unique in US Earth science. For example, the Earth's magnetic field is critical to Sun-Earth science, and so it is unclear why moving this program is advisable. The advantages and disadvantages of this move are unclear to the Committee, and we would appreciate clarification of the rationale and opportunity for input. Since the location of the Geodynamics program is a shared concern of our space science colleagues (they will be the recipients of the program), the details of how this happens, and how the budgets are adjusted, should be of great interest to both memberships. This makes it an ideal joint issue to take up at our November meeting. In the meantime, the geodynamics community should be re-assured that this transformation will not pre-empt the historical focus of geodynamics at NASA and its continuing role in the international long-term study of the Earth. For this purpose, ESSAAC recommends that the priorities identified in the SESWG report be kept as strong guiding principles of this program.

Weather Program. The continued appropriateness of a separate "Weather" focus area within the earth sciences strategic plan and organizational structure was raised by NASA staff. After deliberation, the committee recommends that the weather focus area should be retained and not subsumed into the climate or water areas. The reasons for this recommendation flow from the intrinsic societal and intellectual importance of the area, the revolutionary potential of upcoming cloud -related missions (CLOUDSAT and CALIPSO), gains to be realized for weather prediction from new data assimilative and ensemble modeling schemes, and the promise of next generation, cloud-resolving NWP forecast models which will rely on unique NASA observational data for verification and initialization purposes. The committee also notes that improved weather forecasting is goal number one of the draft 10-year OSTP strategic plan for Earth Observations recently released by the White House. NASA should continue to emphasize its unique and critical role in weather research in accord with the high national priority given to the area and continue to participate vigorously in the US interagency Weather Research Program (USWRP).

Applications Program. ESSAAC is pleased to see some of the successes in developing improved data sets within the Earth Sciences applications program that provide better information to specific decision-makers. However, the current suite of data products remains limited, and the applications program does not appear to support research that would enable new uses of NASA observations and modeling efforts. The applications effort would benefit from a more strategic approach for the program and the development of a strategic plan based on community involvement in setting priorities and goals for the program.

Finally, the committee applauds the recent development of NASA Announcements of Opportunity to support coupled Earth system model developments (MAP) and Research Opportunities emphasizing synergy with Space Sciences (ROSES). We also look forward to hearing the results of the upcoming Asilomar community workshop which will be developing the roadmap for implementation of the strategic plan for education.

We thank the leadership and staff of NASA for enabling a successful and productive meeting of the Committee. We look forward to the joint meeting of the Earth and Space advisory committees in November.